

- If we assume that a useful rate of heat energy needed for cooking is 150 W, then what is the area of the oven (including reflectors) that is needed to intercept this amount of radiation?

### SOLUTION

The collector area is calculated by assuming that the solar oven is 20% efficient and that 85% of the insolation is the direct component.

Assuming a noontime insolation rate of  $900 \text{ W/m}^2$ , the direct component is  $900 \times 0.85 = 765 \text{ W/m}^2$

The energy needed for the cooker (150 W) is equal to the direct component times the efficiency times the intercepted area:

$$765 \text{ W/m}^2 \times 0.20 \times \text{area} = 150 \text{ W}$$

Therefore, the area is  $150 / (765 \times 0.2) = 0.98 \text{ m}^2$